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Fimbristylis species of section *Abildgaardia* (Vahl) Benth.

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ABSTRACT

Descriptions, illustrations and citations of specimens of *Fimbristylis monostachyos*, type species of section *Abildgaardia*, and its ally, *F. triflora*, are given. The close morphological relationship between these species is discussed.

INTRODUCTION

Of the eighteen sections recognised within *Fimbristylis* Vahl by Kern (1955), three were differentiated on distichously arranged floral glumes. In two of these, *Abildgaardia* (Vahl) Benth. and *Fuscae* Ohwi, rachillas were persistent with the glumes spirally arranged in the upper two-thirds of the spikelet. Further distinction depended upon achene structure, nuts being large, pyriform and tuberculate in *Abildgaardia*; small, obovate, smooth or verruculose in *Fuscae*. Both sections included only trigynous species with three-angled achenes and triquetrous styles developing three apical branches.

Koyama (1961), because of failure to delimit subgenera since, "the morphological uniformity of *Fimbristylis* makes it very difficult to circumscribe the infrageneric groups . . .," recognised related species as series rather than sections. In series *Monostachyae* Ohwi, he united both *Abildgaardia* and *Fuscae* of Kern (l.c.), ignoring in so doing, differences in achene structure. Koyama also placed little emphasis on two-ranked basal glumes, for he regarded *Abild-*

gaardia as an extreme group of *Trichelostylis* (Lestib.) Boeck. in a broad sense, in which section species such as *F. complanata* (Retz.) Link and *F. microcarya* F.v.M. with glumes spiral throughout the spikelet, are placed.

Kern's arrangement seems to reflect more closely relationships apparent from external morphology, so that at the present stage of investigation it is preferred.

Two recently described Southern African species, *F. hygrophila* and *F. variegata* (Gordon-Gray, 1965), were tentatively referred to sections *Abildgaardia* and *Fuscae* respectively, pending detection of closer affinities when world integration of regional studies is possible. Achenes in the former are transversely ribbed not tuberculate, while in *F. variegata* they are not small. Evaluation of such structural differences with only the present understanding of sectional relationships to guide, is difficult.

Two other long established species, both well represented in Southern and Tropical Africa, fall without question within *Abildgaardia*, for *F. monostachyos* (L.) Hassk. is the type species of this section, while *F. triflora* (L.) K. Schum. shows close affinity with *F. monostachyos*.

Descriptions of species in this and in subsequent papers, except where otherwise stated, are based on field and laboratory observation of living material, together with study of herbarium specimens in conjunction with available literature. When measurements are recorded, the limits of actual measurements are followed, in parenthesis, by the mean and standard error of the mean. The two last named parameters were calculated from measurements of not less than twenty specimens from localities widely spread throughout the range of distribution in Southern Africa.¹

Representative citations only are published, but complete lists of all specimens studied are available in the Herbarium of the University of Natal. One good specimen, as far as possible bearing mature reproductive organs, is cited for each magisterial district. Controversial specimens and others with special interest are also included. Attempts were also made to cite specimens from all herbaria from which sheets were borrowed for study.²

1. *Fimbristylis monostachyos* (L.) Hassk., Kern in Blumea 8 (1):160 (1955); Koyama in Journ. Fac. Sci. Univ. Tokyo III 8 (3):117 (1961). *F. monostachya* (L.) Hassk., Pl. Jav. Rar: 61 (1848); Ridl. in Trans. Linn. Soc., Ser. II, Bot. 2:149 (1884); Clarke in Hook. Fl. Brit. Ind. 6:649 (1893) and in Dur. & Schinz, Consp. Fl. Afr. 5:607 (1895); K. Schum. in Engl. Pfl. Ost. Afr: 124 (1895);

¹ Too few specimens precluded calculations for some species.

² Herbarium abbreviations are as noted in Gordon-Gray, 1965, together with RLCS—Herbarium of International Red Locust Control Service, Abercorn, Zambia, and SGH—Swaziland Government Herbarium, Mbabane, Swaziland.

Clarke in Dyer Fl. Cap. 7:203 (1898); Rendle in Cat. Afr. Pl. Welw. 2:122 (1899); Clarke in Dyer Fl. Trop. Afr. 8:424 (1902) and in Bull. Misc. Inf., Add. Ser. 8:109 (1905) name only; Burt Davy and Leerndertz-Pott in Ann. Tvl. Mus. 3:132 (1912) name only; Phillips in Ann. S.A. Mus. 16:323 (1917); Schönl. in S.A. Cyp., Mem. Bot. Survey S. Afr. 3:34 (1922); de Wild. in Pl. Bequaert 4:206 (1926—7); Dyer in Rec. Albany Mus. 3:470 (1927); Cherm. in Cat. Pl. de Madag. Mem. Acad. Malgache: 32 (1931); Brain in Proc. Rhod. Sc. Assoc. 33:84 (1934); Hutch. in Fl. W. Trop. Afr. II, 2:474 (1936); Peter in Fedde Rep. 40:402 (1936—7).

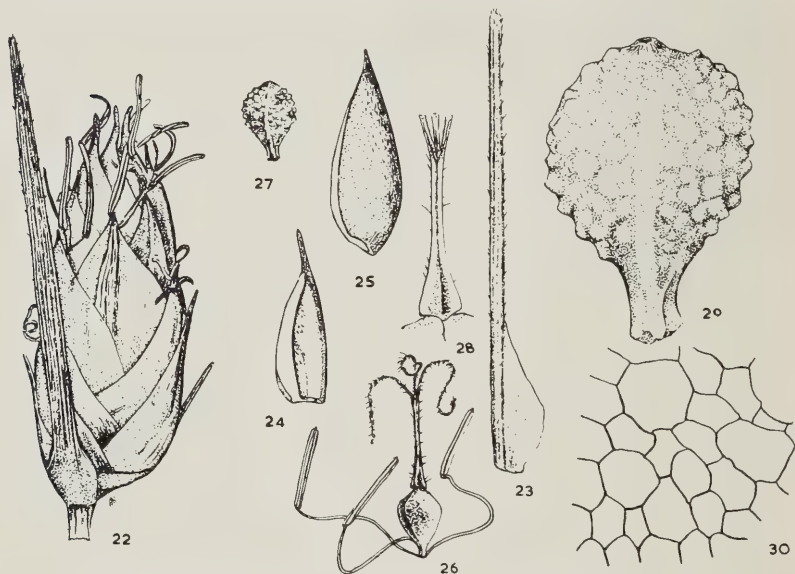
Cyperus monostachyos Linn. in Mant. Pl. 2:80 (1771); Rottb. in Descr. et Icon. Pl. :18, t.13, fig. 3 (1773).

Abildgaardia monostachya Vahl in Enum. Pl. 2:296 (1806); Kunth in Enum. Pl. 2:247 (1837); Boeck. in Linnaea 37:53 (1871); Oliv. in Trans. Linn. Soc. 29:169, t.109, fig. a (1875); Bak. in Fl. Maur.: 416 (1877); Robyns & Tournay in Fl. des Sperm. du Parc. Nat. Albert 3:259 (1955).

Perennial, erect, up to 52 cm. in height, tufted: *rhizome* woody, up to 5 mm. wide, of usually slightly swollen shoot bases confluent in uniseriate row or less frequently an irregular tuft; *leaf bases* pale to dark brown, faintly striate, firm to hard, sometimes coarse, forming persistent tunics to shoots except in first year of growth: *leaf sheaths* entire, soon splitting apically, rounded, glabrous, keel faint, green to yellowish, 5-many nerved, membranous zone chartaceous to light brown, with or without darker speckles, faintly many nerved especially basally, mouth truncate; *ligule* 0; *blades* always developed, up to 22 cm. long, 0.5—1.7 (0.85 ± 0.06) mm. wide, linear to almost filiform, firm to stiff, glabrous, margins thickened to ridged, one slightly involute, scabrid pubescent, apex acute to acuminate: *flowering stems* erect, flattened, markedly two-angled below inflorescence, angles scabrid, occasionally smooth, glabrous: *inflorescence* usually a solitary terminal spikelet, occasionally one sessile or pedicelled spikelet added; *pedicel*, when present up to 15 mm. long, as flowering stem; *bracts* 2—3, up to 13 mm. long, infrequently exceeding spikelet, glume-like with keel excurrent forming blade-like apiculus up to 10 mm. or (in upper) mucron 1—2 mm. long: *spikelets* 7—19 (12.35 ± 0.63) mm. long, 3—6 (4.45 ± 0.19) mm. broad, up to 29 mm. in extreme age, compressed in lower half (particularly noticeable when young) almost cylindrical in upper half, ovate to elliptic when young, lanceolate to oblong in age, green to yellowish green when fresh, paling with drying, basal glumes early deciduous; *rachilla* spiralled, winged by rounded, often unequal, pale to darker brown, often speckled glume bases; *glumes* lowest 1—4 sterile, remainder fertile, 5.0—7.5 (6.22 ± 0.15) mm. long, 3.4—5.8 (4.99 ± 0.15) mm. in total width, broadly ovate to ovate oblong, glabrous, keel rounded, of 1—5 yellowish to pallid veins, mid-

nerve well marked, excurrent into mucron approximately 1 mm. long, apex acute: *stamens* 3; *anthers* 1.6—3.6 (2.41 ± 0.12) mm. long, cream to light yellow, crest rounded; *style* 2.6—4.6 (3.68 ± 0.12) mm. long including darker brown pyramidal base, 3-winged, wings transparent, delicate, extending on to style base, drying and shrivelling in age, margins white villous; branches 3, concolorous with style base: *achene* 2.0—2.8 (2.35 ± 0.06) mm. long, 1.2—1.9 (1.44 ± 0.05) mm. broad, trigonous, obovate almost pyriform with apex shortly projecting, green when young becoming fawn then white, occasionally pale brown with dark brown of inner pericarp layers discernible, surface reticulate, faintly to prominently tuberculate; *outermost cells to pericarp* subquadrate, velate (loosening of this layer causing eventual white coloration of achene).

Flowering period: Generally September to March, occasionally July to April.



Figs. 22-30 *Fimbristylis monostachyos*, L. Hassk. (Huntley 556)
 22—spikelet; 23-4—two basal glumes; 25—fifth glume from spikelet base; 26—young floret;
 27—achene (all $\times 5$); 28—style base and style ($\times 10$); 29—achene ($\times 20$); 30—epidermal
 pericarp cells ($\times 140$).

TYPE: Deposited in Linnaean Herbarium, London. Linnaeus (1771) gives the collector as Koenig and the type locality as "In India Orientali", but it is not known whether the sheet in the Linnaean Herbarium is Koenig's. The type

consists of a short portion of rhizome, leaves, and flowering stems, the last named bearing each a solitary spikelet.

CONGO. Without distr: Katanda, *Lebrun* 7554 (NU, BR); Kasonsero, vallee Semliki, *Bequaert* 5065 (BR); Lingila, *Dupuis* s.n. (BR); Broutle, *Binga* s.n. (BR); Plaine Rusiri, basin Lushima, *Germain* 6909 (PRE).

UGANDA. Mbara distr: Ankole, *Eggeling* 4867 (EA).

KENYA. Narok distr: Ndunyangero area near Njura settlement, about 9 ml. from Olulunga, *Glover, Gwynne & Samuel* 1666 (PRE); Nairobi distr: Nairobi Royal National Park, *Verdcourt* 3253 (PRE).

RWANDA. Parc. Nat. Kagera, plaine de Kamabaka, *Germain* 1494 (PRE).

TANZANIA. Bukoba distr: Kagera Port, *Haarer* 2362 (EA); Musoma distr: 46.6 ml. from Bologonja River via Kleins Camp, *Greenway* 10,131 (PRE); N. Kilosa distr: Tembo, *Haarer* 1955 (EA, BR).

ZAMBIA. Luangwa distr: Mt Makulu Pasture Research Station, 9 ml. S. of Lusaka, *Robinson* 1492 (EARO); Batoka distr: Kalomo, *Robinson* 2547 (PRE, NU, EARO).

MOZAMBIQUE. Sabie distr: Namaacha, Sul do Save, *Myre & Carvalho* 303 (LM, NU).

RHODESIA. Gwelo distr: Gwelo, *Brain* 7483 (SRGH); Melsetter distr: Melsetter, *Otterson* s.n. (SRGH).

TRANSVAAL. Sibasa distr: Malathlapanga, near Sibasa, *van der Schyff* s.n. (PRE); White River distr: Kruger National Park, Pretorius Kop, *van der Schyff* 2190 (PRE); Rustenburg distr: Rietfontein, *Pole Evans* H18909 (PRE); Brits distr: Hartbeestepoort near Pretoria, *Moss* 8856 (J); Pretoria distr: Pretoria North, *Theiler* s.n. (GRA, PRE); Middelburg distr: 47 ml. from Stofberg on Steelpoort rd., *Meeuse* 10257 (PRE); Belfast distr: Machadodorp, *Galpin* 13013 (BOL, PRE); Barberton distr: 19 ml. from Havelock Mine, Barberton rd., *Gordon-Gray* 6107 (NU); Krugersdorp distr: Magaliesberg, *Zeyher* 1752 (BOL, NBG, PRE); Johannesburg distr: Witwatersrand, Frankenwald, *Gilman* s.n. (J); Benoni distr: near Dunswart, *Moss* 13900 (J); Carolina distr: Carolina, *Rademacher* s.n. (PRE); Ermelo distr: Amsterdam, Athole Pasture Research Station, *Norval* 145 (PRE); Potchefstroom distr: Boskop, *Louw* 583 (PUC, PRE, PRU); Vereeniging distr: Vereeniging, Burttholm, *Burt Davy* 15204 (GRA, J); Heidelberg distr: Uitgevalen, *Burt Davy* 9168 (PRE); Standerton distr: Standerton Govt. Farm, *Burt Davy* 921 (PRE, BOL); Wakkerstroom distr: Wakkerstroom, Beeton 139 (NBG); Piet Retief distr: Piet Retief, *Leipoldt* s.n. (GRA, PRE);

SWAZILAND. Mbabane distr: Komati Pass, *Compton* 31046 (SGH); Hlatikulu distr: Hlatikulu, *Gordon-Gray* 6170 (NU).

ORANGE FREE STATE. Heilbron distr: Heilbron, *Goossens* 502 (PRE, BLFU);

Senekal distr: upper slopes Doornkop Groot, *Goossens* 914 (PRE, PUC); Bethlehem distr: Golden Gate National Park, *Liebenberg* 6810 (PRE); Thaba Nchu distr: lower n. slopes Thaba Nchu mt., *Roberts* 2946 (PRE).

NATAL. Vryheid distr: Hlobane, *Johnstone* 324 (NU); Ubombo distr: Mkuze Game Reserve, *Ward* 3534 (NPGF, NU); Dundee distr: Dundee, Townlands, *Shirley* s.n. (NU); Helpmekaar distr: Helpmekaar *Kleber* s.n. (NU); Nongoma distr: 30 ml. from Mkuze on Nongoma rd., *Gordon-Gray* 4721 (NU); Hlabisa distr: Hluhluwe Game Reserve, *Ward* 2096 (NU, NPGF, BR); Estcourt distr: Umhlumba Mt., *West* 1484 (NH); Lower Umfolozi distr: Umfolozi Game Reserve, *Feely* 86 (NPGF, NU); Eshowe distr: Tugela Weir above Mandini, *Edwards* 1599 (PRE, NU); Mtunzini distr: Mtunzini, *Mogg* 4513 (PRE); do., "Hamewith", *Mogg* 5925 (PRE, SRGH, GRA); do., *Mogg* 6033 (GRA); Lions River distr: Lidgetton, *Mogg* 835 (SRGH, PRE); Pietermaritzburg distr: Pietermaritzburg, Alexandra Park, *Huntley* 539 (K, NU); Inanda distr: near Phoenix, *Wood* 4918 (BOL, NBG, PRE, NH); Camperdown distr: Nagle Dam, *Wells* 1665 (NU); Pinetown distr: Mariannhill, below and behind hospital, *Bayer* s.n. (NU); Durban distr: Isipingo North, *Ward* 556 (K, M, NU); Umzinto distr: Hibberdene, *Bayer* s.n. (NU); Alfred distr: Harding, Bedford Farm, *Lennox* s.n. (NU); Port Shepstone distr: Port Edward, *Huntley* 715 (NU).

BASUTOLAND. Leribe distr: Leribe, *Dieterlen* 549 (NBG, NH, PRE); Maseru distr: Roma, *Ruch* 2374 (PRE).

CAPE PROVINCE. Umzimkulu distr: Umzimkulu, *Tyson* 2868 (NBG); Umtata distr: between Gekau and Bashee R., *Drège* s.n. (NBG); Queenstown distr: Queenstown mts., Fincham's Nek, Galpin 2548 (BOL, GRA, PRE); Elliotdale distr: Tembuland, between Bashee R. and Morley, *Drège* s.n. (K); Willowvale distr: Willowvale, Qora R. mouth, *Hilner* 461 (GRA); Stutterheim distr: Dohne Research Station, *Acocks* 9266 (PRE); Kentani distr: Kentani, *Pegler* 1096 (GRA, BOL); Komgha distr: near Komgha, *Flanagan* 914 (PRE, GRA, BOL); Victoria East distr: Lovedale, Blackhill, *Barker* 2778 (NBG); Kingwilliamstown distr: Kingwilliamstown, e. slopes above cemetery, *Hilner* 105 (GRA); East London distr: East London, *Rattray* 815 (GRA); Albany distr: Grahamstown, *MacOwan* 188 (BOL, GRA, NH).

In Africa the species also occurs in Angola (*Rendle*, 1899) and West Tropical Africa, (*Hutchinson*, 1936) but no specimens from these localities have been seen.

WORLD DISTRIBUTION. The species is also known from Malagasy, Mauritius, India, Malaysia, Southern Asia, Australia, Polynesia, Temperate and Tropical America.

Kern (1955) corrected the orthographic error made by *Hasskaal* (1848). *Fimbristylis*, by its ending and common usage is feminine. In agreement the

epithet, of Greek derivation, must take the ending "os" not "a".

In Southern Africa, on the Natal coast in particular, marked variation in robustness of plants growing in juxtaposition is frequent. Specimens with broad, coarse leaf bases, blades approximately 1.5 mm. in width and stout flowering stems occur beside more slender plants, often equally tall, but with finer, softer leaf bases and blades 0.5—0.7 mm. in width. Huntley 715, and Mogg 6033, 4513, 5925, illustrate such variation.

Fimbristylis monostachyos is a ubiquitous associate of grasses in the thornveld and savannah regions of eastern Southern Africa, flourishing particularly where the grass cover is sparse and competition with taller plants not too severe. Apparently without soil preference, it occurs in sand, shale or clay, in black turf of vleis, or in soil pockets amongst rocks.

2. *Fimbristylis triflora* (L.) K. Schum. ex Engl. in Abh. Preuss Akad. Wiss: 14 (1894) and in Engl. Pfl. Ost. Afr: 124 (1895); Turrill in Kew Bull. 1925: 71 (1926); Hutch. in Fl. W. Trop. Afr. II, 2:476 (1936); Peter in Fedde Rep. 40:402 (1936—7); Podlech in Mitt. der Bot. Staatss., Munchen, 3:528 (1960).

Cyperus triflorus Linn. in Mant. Pl. 2:80 (1771).

Abildgaardia tristachya Vahl in Enum. Pl. 2:297 (1806); Nees in Linnaea 9:289 (1834) name only; Kunth in Enum. Pl. 2:248 (1837); Boeck. in Linnaea 37:54 (1871).

Fimbristylis tristachya Thwaits in Enum. Pl. Zeyl: 434 (1864) non R. Br. non Nees; Clarke in Fl. Brit. Ind. 6:649 (1893) and in Dur. and Schinz., Consp. Fl. Afr. 5:610 (1895) and in Dyer Fl. Trop. Afr. 8:424 (1902) and in Bull. Misc. Inf., Addit. Ser. 8:109 (1908) name only, and in Illustr. Cyper. t 43. f. 12—14 (1909).

Abildgaardia lanceolata Schumach in Beskr. Guin. Pl. :33 (1827). *A. monostachya* Vahl var. Hassk. in Pl. Jav. Rar.: 61 (1848).

Perennial, erect, up to 91 cm. in height (40—70 usual for Southern African examples) tufted: *rhizome* up to 9 mm. wide, *leaf bases* dark brown to black, striate, sometimes slightly polished, firm to hard, coarse, forming well marked persistent tunics to shoots, except in first year of growth; *sheath mouth* truncate, occasionally sloping and oblique; *blades* always developed, up to 40 cm. long (30 cm. usual for Southern African specimens) 1.0—2.0 mm. wide, linear, stiff, glabrous; *inflorescence* variable, up to 5.5 cm. long, up to 7 cm. wide, usually a simple "umbel" (anthela) of one central sessile and 1—4 pedicelled spikelets, occasionally of central sessile spikelet only (all possibilities may be represented on a single plant) pedicels up to 3 cm. long; *bracts* 2—4, up to 2 cm. long; *spikelets* 11—22 mm. long, sometimes 32 mm. in extreme age, 4—7 mm. wide, greenish yellow when fresh, pallid to yellowish when dry; fertile *glumes* 5.8—9.3 mm. long, 3.2—6.1 mm. in total width, keel of 1—11

pallid to brownish veins: *anthers* 2·9—4·1 mm. long; *style* 4·5—5·5 mm. long including long pyramidal style base that becomes dark brown in age, faintly 3-winged when young to 3-angled at maturity: *achene* 2·3—3·1 mm. long, 1·5—1·9 mm. broad, obovate to markedly pyriform, apex shortly projecting,



Figs. 35-42 *Fimbristylis triflora* (L.) K. Schum. (Ward 2831)
 35—spikelet; 36—basal glume; 37—fifth glume from spikelet base; 38—young floret;
 39—achene (all $\times 5$); 40—style base and style ($\times 10$); 41—achene ($\times 20$); 42—epidermal
 pericarp cells ($\times 140$).

green when young, becoming fawn to dark brown, eventually almost black, shining, occasionally pallid to off-white; surface reticulate, etuberculate to prominently tuberculate; *outermost cells to pericarp* subquadrate, eventually velate. Otherwise as *F. monostachyos*, including flowering period and remarks relating to type and type locality. The type consists of inflorescences and flowering stems only. No vegetative organs are present.

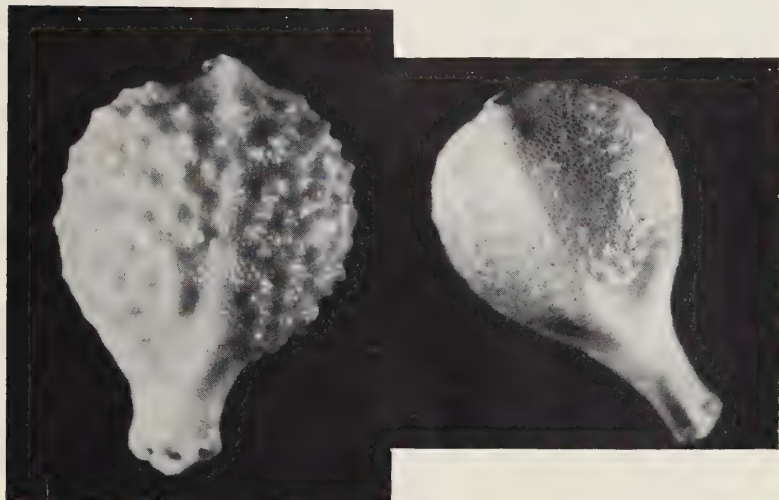


Fig. 43 Mature achenes: left—*F. monostachyos* ($\times 30$); right—*F. triflora* ($\times 20$).

GHANA. Nungua distr: *Ankrah* s.n. (PRE).

TOGOLAND. Near Lome, *Warneke* 140 (EA).

TANZANIA. Tanga distr: Tanga Bay, *Greenway* 1859 (EA); Pemba, Tondooni, *Greenway* 1426 (EA); Pangani distr: am Pangani bei Korogwe, *Peter* 3862 (EA); Zanzibar, Kasoli, *Tait* 19 (NU); Zanzibar, without precise locality, *Tait* 30 (NU).

ZAMBIA. Babemba distr: Lushiba Bay System: n.e. Lake Mweru, *H.D.B.* 523 (RLCS); Batoka distr: Muckle Neuk, 12 ml. n. of Choma, *Robinson* 445 (EARO).

MOZAMBIQUE. Zambesia, Chinde distr: Micaune, S.A. Medal Estates, Nuanaiu, *Pedro* 27 (PRE); Buzi distr: Beira, *Rogers* 104564 (NGB, BUL); Sofala distr: Manica e Sofala, Mucarangue, *Lea* 80 (PRE).

SOUTH WEST AFRICA. Okavango Native Territory, 4 ml. e. of Masari Expt.

Farm on road to Nyangana, *de Winter & Wiss* 4108 (PRE, M); E. Caprivi, Zipfel, *Killick & Leistner* 3045 (PRE).

RHODESIA. Sebungwe distr: Chikwatata Hot Springs, Bingo, *Phipps* 1393 (SRGH, PRE).

TRANSVAAL. White River distr: Pretorius Kop, *van der Schyff* 3376 (PRE).

NATAL. Ubombo distr: Nibela, *Ward* 1706, 1708 (NU); Hlabisa distr: St Lucia Park, n. of Mpate R., *Ward* 4505 (PRE, NPGF, NU); Mtunzini distr: Mtunzini, "Hamewith", *Mogg* 5811 (K) (holotype var. *capitata* Turrill), do., 5865 (PRE, GRA).

WORLD DISTRIBUTION. The species is also known from India.

In Southern Africa, *Fimbristylis triflora* occurs amongst grasses in marshes, temporary swamps and on seasonally inundated flats. As far as is known at present it is limited to sandy soils.

DISCUSSION

F. triflora may be described as a more robust state of *F. monostachyos*. Nevertheless there are morphological differences, albeit slight and of degree rather than absolute in character, which, when considered collectively and in conjunction with differing ecological preferences indicate discontinuity between the taxa. These differential characters (White, 1962) are summarised in Table 1. Most reliable features are printed in italics.

TABLE 1

Morphological differences between *F. monostachyos* and *F. triflora*

<i>F. monostachyos</i>	<i>F. triflora</i>
Plants bearing mature achenes up to 55, generally 10—30, cm. in height.	Plants bearing mature achenes up to 95, generally 40—75, cm. in height.
Leaf bases clothing rhizome pale to dark brown, fine to coarse, forming conspicuous persistent tunics to shoots only when sheaths coarse.	Leaf bases clothing rhizome dark brown to black, slightly polished, always coarse, forming dark colored persistent tunics to shoots.
Leaf blades 0.5—1.7 mm. wide, sometimes almost filiform, otherwise linear.	Leaf blades 1.0—2.0 mm. wide, linear, rather coarse and stiff.
<i>Inflorescence a solitary terminal spikelet; occasionally an "umbel" (anthela) of terminal spikelet with 1—2 pedicelled spikelets added; rarely a head of 2 sessile spikelets.</i>	<i>Inflorescence an "umbel" (anthela) of one terminal sessile spikelet with 1—4 pedicelled spikelets added; occasionally of solitary terminal spikelet only; rarely a head of 2 (or more) sessile spikelets.</i>
<i>Living spikelets green to yellowish-green, paler when dry.</i>	<i>Living spikelets greenish-yellow, pallid to yellowish when dry.</i>
Achene, even when fully matured on plant, not shining black (all degrees of coloration from white to dark brown common, white predominating).	Achene, when fully matured on plant, shining black (all degrees of coloration from off-white to dark brown common, pale brown predominating).

The close relationship between these two species is worthy of discussion, for it reflects very well the situation often encountered within Scirpeae, particularly when world taxa are under consideration, for pairs or groups of species often show very close morphological similarity. All individual points of difference between *F. monostachyos* and *F. triflora* occasionally break down. For example, the inflorescence in the former is generally a solitary spikelet, in the latter a simple "umbel" of 1 sessile and 1—4 pedicelled spikelets. However, plants of *F. monostachyos* sometimes bear simple "umbels" of 1 sessile and 1—2 pedicelled spikelets, while plants of *F. triflora*, particularly at their southerly limit of distribution in Africa, may bear only solitary spikelets. Such plants are usually infrequent within the population, so in the field, where habitat conditions may also be assessed, confusion can be avoided. In the herbarium such plants are disconcerting, especially so when more than one unusual morphological feature is represented in an individual.

Achene colour (Clarke, 1902) has also been relied upon in diagnosis, but is unsatisfactory because of changes during maturation. If matured on the plant, fertile achenes of *F. triflora* are eventually shining black due to pigmentation of sclerenchyma underlying the large outermost epidermal pericarp cells that peel, effectively exposing the dark tissue. Most achenes are shed before this stage is reached. Some remaining attached to the spikelet do not develop fully, probably due to failure of fertilization, and so lack this coloration. Shining black achenes have never been observed for *F. monostachyos*, but light to dark brown pigmentation of pericarp sclerenchyma is not unusual.

Many achenes of *F. triflora* are more markedly pyriform, even spatulate, than are those of *F. monostachyos* (see Fig. 43), but too many exceptions exist for the character to have real value in diagnosis. The faint tuberculations evident in the achene of *F. triflora* (see Fig. 43) are sometimes entirely lacking, frequently as prominently marked, as in the achene of *F. monostachyos* (see Fig. 43). Examination of large numbers of achenes of both species laid side by side has shown them to be often indistinguishable in size, shape, colour and markings.

Despite the lack of obvious morphological discontinuity between the species, for even collective consideration of all differential characters sometimes allows of doubt in diagnosis, both species must be maintained, for ecological preferences differ, as does distribution. In tropical regions *F. monostachyos* retains its relatively low stature and appears to favour grassland habitats at higher altitudes, while plants of *F. triflora* become very tall and mostly favour coastal areas, vleis or other seasonally inundated, relatively lower lying regions.

Hybridisation would seem an obvious possible explanation for close morphological relationship, but where the species are sympatric, no putative hybrids have been detected, possibly because such areas fail to provide habitats

intermediate between the differing environments favoured by *F. monostachyos* and *F. triflora*.

Chromosome studies, stomatal measurements and artificial hybridisation might provide information of significance in further elucidating relationships.

Turrill (1925) established within *F. triflora*, variety *capitata* (holotype Mogg 5811, K), that was distinguished from the type by the spikelets of the flowering stem all being sessile and clustered into a compact head. Field study has shown this is only occasional on a plant and that "umbels" may be produced by the same plant in the same season. Similar compact heads have occasionally been observed within *F. monostachyos* (Burt Davy 15204, Hilner 105, Mogg 4513). Consequently Turrill's variety is not maintained.

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